DATA PROCESSING DIGEST

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Management Decision-making Techniques

REDUCING THE QUEUE

Brian Dagnall, Esso Refinery, England
AUTOMATION PROGRESS, May 1958; pages 194-196.

Here is a remarkably clear discussion of queuing theory which will be welcome reading for many who need to understand the subject to some extent, but who are scared off by the summation and integral signs which pepper most queuing articles. First of all, the terminology of queuing theory is defined in very simple terms. Then simple examples are given of queuing problems, covering life experiences from waiting at the "racecourse tote windows," to the repair of idle machines. The article explains briefly how queuing problems may be simulated for solution on a computer when they are too complex for theoretical solution. In the final part on the generation of random numbers we run into the first integral sign, but by this time we have a good, if elementary understanding of queuing problems, and the equation may be safely ignored by the non-mathematical.

Characteristic features of all queuing problems include the "customers" needing some kind of service (these may be humans or inanimate objects), the queues or waiting lines which the customers form, the "server" (which may or may not be a human), and the service station. Stations may be parallel (as in the "tote windows"), or in series (e.g. officials to be seen in succession for some government business). The "queue discipline" decides which customer shall be served next, as in the last-in-first-out or first-in-first-out systems. "Service time" is the time spent serving the customer, and "inter-arrival" time is the time between two successive customers joining the queue. To find how busy the service station is, we use the ratio of the mean service time, multiplied by the number of stations, to the average inter-arrival time. This ratio is the "traffic intensity."

Both inter-arrival and service times may be either constant or random, known respectively as "determinate" and "Markovian, "or D and M." Queuing problems may thus be classified according to the distribution of inter-arrival times, of service times, and the number of service stations in this fashion: M/D/2 (which means a

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system in which the customers arrive at random, the service time is constant, and the number of service stations is two).

By calculating the relative frequencies of different queue sizes or of different waiting times for either constant or random patterns, we find that waiting time is least for constant interval and service times. This is illustrated by the post office with two windows, at which queues may be shortened if one window deals with ordinary matters, leaving the other one for unusual or time-consuming queries. A study in arrival patterns for machines needing servicing, along with average incidence of breakdown, average repair time, and the number of machines per maintenance man, may be used to calculate the average idle machine time. From this, the ratio of machines to men may be selected to adjust wage costs and down-time losses to advantage.

SIMULATION TECHNIQUES IN OPERATIONAL RESEARCH

John Harling, ORbit Ltd.
OPERATIONAL RESEARCH QUARTERLY, March 1958; pages 9-21.

Simulation is defined as "the technique of first setting up a stochastic model of a real situation, and then performing sampling experiments upon the model." The following stages in investigating the properties of a real system are given:

"1. Reduction of the raw data of the problem to an appropriate form.

2. Construction of a model of the real system which neither oversimplifies the system to the point where the model becomes trivial, nor carries over so many features from the real system that the model becomes intractable and prohibitively clumsy.

3. Bringing the data and the model together in a sampling experiment, whose purpose is to discover how the real system behaves under a variety of prescribed conditions."

A simple model may suffice

In using simulation, "the tendency has too often been, among operational research workers, to transfer all the detailed difficulties in the real situation into the model, to pay scant attention to the reliability or precision of the answer, and to hope that a large computer will get one out of his difficulties. Quite apart from the unsatisfactory nature of this approach, it is also likely to cost a lot of money, since machine time is not to be had for nothing."

"It is sometimes forgotten that not every simulation requires an electronic computer. In any case, whether it be decided to run the final simulation on a large machine or not, it is worthwhile to test out the model on a desk calculator before writing a final machine programme....Probably the main machine requirement in a simulation

is a large fast-access store....[Also] it is most important that the machine be easy to programme."

The article points out that few case histories are published, because "a simulation undertaken by an industrial company contains the kind of data that a company does not wish to disclose."

"Generally speaking, a simulation should only be used when one is satisfied that a simple theoretical model is wholly inadequate to solve the problem." A short case involving shipping loading is described.

A DISCUSSION OF RANDOM METHODS FOR SEEKING MAXIMA

Samuel H. Brooks, Technical Operations Inc., Monterey, California
OPERATIONS RESEARCH, March-April, 1958; pages 244-251.

"In recent years, the area of endeavor known as the design of experiments has been increasingly concerned with maximum-seeking experiments. In the attempt to attain the greatest profits, biggest harvest, highest yield or, by some criterion, the best possible result, there is a strong need for procedures that have a sound mathematical basis. The direct purpose of such procedures is to estimate what combination of factors would produce the best possible result...."

Factorial, univariate, steepest ascent, and random

"In addition to the intuitive approach, there are four basically different methods that the experimentor may employ. These are the factorial method, the univariate method, the method of steepest ascent, and the random method."

In the factorial method, selected combinations of various levels of factors are tested by trials to determine the response. "An estimate of the optimum factor combination is made from the responses."

The univariate method is a sequential procedure. A first guess is made of the optimal factor combination. Holding all other factors fixed, trials are made as one is varied. This is repeated with other factors varied. An estimate is made of the optimum combination and the trials are repeated with smaller variations in each factor until "a diminishing of returns suggests termination."

The steepest ascent method starts by guessing at the optimum point. One then makes a trial here and determines how to vary each factor slightly so that the next trial will produce the greatest gain in response. When an area is found where no changes offer improvement, an optimum has been located.

"In the application of a random method trials are made at combinations of factor levels selected in some random fashion. The

estimate of the optimal factor combination is simply that combination of factor levels which produced the maximum observed response, i.e., 'the winner.'"

The number of trials required for the random method does not depend on the number of factors.... When the number of factors is large and the number of trials is restricted, it may not be possible to carry out even an abridged version of the other maximum seeking methods." But often 20 to 300 trials will give useful confidence levels, with the random method.

"In many commercial and military problems, it is possible to simulate the operation by a mathematical procedure or model. The question of frequent interest is: what is the combination of decision parameters that maximizes the response, measure of effectiveness, or profit. The model may be of such complexity and/or size as to defy any attempt at an exact or approximate solution. In these situations it may be possible to apply the random method--in an electronic computer if necessary--to yield an approximate solution backed up by a strong statement of confidence."

TOP MANAGEMENT CONTROL

BUSINESS, May 1958; pages 66-71.

The British Institute of Management has been conducting research in the type of information top management needs. It has discovered that, regardless of the size of the company or the type of product it makes, there are six general types of firm, each using a distinct method of coordinating sales and production, and that any two firms which belong to the same coordination type can expect to have similar planning and control problems. "Once their managements are prepared to recognize this, and to forget that their products are different, they can learn from each other to a degree unknown before."

All businesses are of six types

The six types of firms are as follows:

Type A: "Long-term quantity producers making and selling intensively one or a few products of their own choice, made in advance of orders for current sale. Example: Mass-produced cars."

Type B: "Stock-level producers which set out to make and maintain a comprehensive range of products of a certain class for sale from stock. Examples: Makers of screws, nuts, bolts, etc."

Type C: "Manufacturers offering, on 'catalog' basis, a wide range of products made to customers' orders. Example: Makers of range of electric switches."

Type D: "Manufacturers specializing in production of large quantities of goods to customers' orders and specifications. Example: Customer-designed packing materials."

Type E: "Contract manufacturers of capital goods of high unit value in form agreed with customers. Example: Large electrical generating plant. (A separate category--EII--has been created for building contractors. Although these have broadly the same information needs as other contractors, variations take into account such things as subcontracting, the necessity to work mainly on site, and the tying up of capital in finished buildings.)"

Type F: "General or jobbing manufacturers, offering production service in specific field. Examples: Jobbing foundries, printers and general engineering shops."

((See DPD, May 1957, page 6: "Six Types of Firm--and the Management Data They Need."))

OPERATIONS RESEARCH AND SYNTHESIS FOR UNDERSTANDING YOUR BUSINESS BETTER

R. A. Duff, General Electric Company, Schenectady, New York
N.A.A. BULLETIN, June 1958; pages 79-86.

Operations research at General Electric is understanding of operations "to make increased understanding available to operating people in much the same way that the physical research scientist makes his results available to the engineer." Their purpose is to increase "the base of knowledge upon which operating people weigh and render decisions," and "the governing philosophy is to look at the business 'whole,' identify orderly patterns that characterize the particular business, gain a better understanding of what these orderly patterns tell us, and then synthesize, through applicable techniques, models that represent the workings of the operation." Questions must be asked about the product or service which the business is selling, and about the external and internal environments in which the business is operating. An example of modeling a business is given, in which an examination of the production function showed the business was actually a highly repetitive production shop, in contrast to its belief that it was a custom job shop.

Applications

COST ACCOUNTING AND COMPUTERS

Maurice S. Newman, Haskins & Sells, San Francisco, California
THE CONTROLLER, May 1958; pages 203-205, 241-243.

Following a discussion of cost accounting requirements, two case histories are reviewed briefly, to show how computers may be used in this area of accounting. In the first case history, the computer was programed to perform the following:

1. Determine the average raw material cost for each mixture of raw material.

2. Cost the materials put into production.

3. Compute the value of in-process inventories.

4. Value the finished production.

5. Revise the standard product costs.

6. Prepare departmental cost reports.

Monthly standard product costs

The computer program involved 1200 program steps which completes the entire routine in 15 minutes. Standard product costs which were formerly revised only once every few years are now revised once a month and are used for pricing inventories. Also, departmental cost variance statements are prepared with greater accuracy than ever before.

The procedure is as follows: "Taking one raw material at a time, the opening balance, the purchases, and any adjustments are added algebraically for both quantities and dollars to determine the average cost of material available for the current month. These raw material average costs are stored for subsequent use.

"The raw materials transferred into process for each required mixture are subtracted from the material available and priced at these average costs. At this point, the results can be compared to determine gains or losses due to variations from the standard formulae.

"The in-process mixtures are computed in a similar manner by averaging the cost of material put into process in the current month with the costs of similar mixtures already in process.... An alternative procedure would have been to value the mixture already in process at the revised standard costs and to set up a reserve for any

inventory gains or losses of this type. This inventory could be adjusted periodically to the cost of sales.

In-process mixture cost

"These in-process mixture costs, with appropriate adjustment for finishing yields, are stored to be used in the finished product costs."

Labor and expense calculations are then made as follows: "Based on the finished production of each department, the work-in-process inventories and the finished-goods inventories are calculated. Standard labor and expense allowances are accumulated by department at the same time as the product costs are determined. When this has been done, the finished-goods production."

To compute cost variances, actual labor costs and expenses for each cost center are read in, and compared with the standard allowances for labor and expense.

In the second case history, a textile company, two separate computer programs are used: one for computing the standard costs and the second program for "utilizing these standard costs in the valuation of finished production, calculation of inventory values, and the determination of operating variances. The first program is used whenever required, and the second program is used once a week. It is expected that this will eventually be coordinated with an automatic production recording system so that the cost accounting will be almost completely automatic."

EDP—PRODUCTION CONTROL APPLICATION

From "Ideas for Management," SPA Meeting Proceedings, 1957.

A transcript of a seminar on aircraft industry use of an electronic production control system is given in full. The system described is that of Hughes Aircraft Company's Electronics Manufacturing Division in Los Angeles.

An IBM 705 is shared with the Finance and Field Service Divisions. An information system has been built to 1) provide management by exception, 2) provide better information for speedier procurement action, and 3) maintain the most economical inventory levels. Input data consisting of schedules, requirements, order releases, receipts, and issues or disbursements are on magnetic tapes or punched cards. Schedules and requirements are kept on master part usage tapes. Order releases, receipts, and disbursements are keypunched or reproduced as they occur and are entered through a card-to-tape operation.

The Action Notice is the principal operating document, issued weekly to reflect the engineering and schedule changes as they affect

Action Notice reflects weekly changes

the parts requirements, which are projected on a monthly need for 10 to 15 months ahead.

The Action Notice is printed only when there is a reason for action. If the material coordinator or buyer fails to correct the situation brought out on the Action Notice within two weeks, another notice labeled "Second Notice" is issued.

The Action Notice has three parts (shown in an illustration). These are 1) the inventory control data from the inventory summary tape, 2) the monthly requirements due into stores, and 3) the data from the first and second sections combined with purchase order information.

The computer program tests for four conditions: over-ordered, under-ordered, surplus stock, schedule variance. If any one of these conditions is present, the entire Action Notice is printed out along with the reason (or reasons). The last line of the third section mentioned above indicates the order change quantities for the specific part projected according to length of contract.

The Action Notice is produced on an off-line printer from magnetic tape. Approximately 10,000 parts are covered by the system, and the part usage master tapes contain about 300,000 records for the 1100 master scheduled end items. From 3000 to 30,000 changes are processed each week, and from 2000 to 4000 Action Notices are printed out.. This number of notices will diminish as buyers learn how to make the necessary corrections.

In addition to the Action Notice routine, the computer is used for scheduling and calculating requirements. Some details are given on the study which preceded the development of the information system, and some suggestions made for avoiding certain pitfalls.

SMALL COMPANY—BIG COMPUTER

Charles F. Clayton, Factory Motor Parts, Inc., San Francisco
AMERICAN BUSINESS, June 1958; pages 33-36.

Although Factory Motor Parts, Inc. has only 80 employees, it has found many benefits from its IBM 305 RAMAC installation. Order processing, credit rating, and purchasing decisions are all handled automatically by the system. As orders come in, a coding clerk notes the numerical code for customer, invoice number, shipping instructions, and adds part numbers for each item ordered. The key-punch operator then punches numeric information only into cards, six items to each card. The computer processes the order and produces additional information as follows: 1. from stored information, punches invoice heading information for 407 printer, 2. finds information on stock items ordered, accumulates stock usage, and keeps running total of sales on each part, 3. checks new stock balance figures and punches

stock level warning cards, 4. extends invoice, figures total and computes taxes, 5. adds this amount to customer's accounts receivable record, 6. checks this record against customer's credit limit and issues a C.O.D. bill for credit manager's attention, 7. writes shipping order and invoice. From this process, also, the computer produces a monthly trial balance of all accounts on the first of the month.

Future plans include having the computer produce the picking tickets. The company finds that it is now able to reduce its inventory to a 90-day supply on hand instead of the 120-day supply previously needed. Moreover, the company is giving its customers better and faster service. ((See DPD: March 1958, page 10: "305 RAMAC in Warehousing Operation."))

REPORT ON GENERAL ELECTRIC'S ELECTRONIC DATA PROCESSING INSTALLATION

From "Ideas for Management," SPA Meeting Proceedings, 1957.

The Data Processing Center at Appliance Park, General Electric's Louisville plant, is administered by the Manager of Finance of one of the decentralized departments, but functions as a service center for four of the five departments located there.

The data processing concept developed by GE at Louisville gives the accountants complete control over the content and format of their financial reports. Each report in the general accounting system is assigned a number, and each line in the report is numbered. The combination of the line and report number is an index "key." Each account in the basic file contains its keys which show those reports in which the account is to appear. The index file is the account "ledger" containing a complete history of each account. After all current transactions are sorted by account number and posted, the index file is exploded. The records created in the explosion are gathered together by report and line number and processed for printing. The detailed instructions for the report format are maintained as a deck of punched cards by the accounting offices. The accountant can have this format altered to suit his own requirements without consulting the computer personnel.

NEW SETUP GIVES TICKET DATA—FAST

RAILWAY AGE, May 26, 1958; pages 28, 29.

The New York Central's West Shore line is using books of pre-punched Kimball tags for commuter tickets, eliminating slow and expensive hand sorting of collected tickets by destination or origin. Tickets are collected from passengers in usual manner and are then forwarded to the auditor of passenger revenue in Detroit who processes the tickets through the Kimball tag reader.

General Information

SOME ASPECTS OF AUTOMATIC DATA PROCESSING IN THE UNITED STATES—

II. A.D.P. IN OPERATION
J.H.H. Merriman and F.J.M. Laver
O & M BULLETIN, April 1958; pages 54-61.

Part I of this article was reviewed in the May issue of DPD. This continues with an evaluation of U. S. office automation, stressing the methods of selection of equipment and electronic business systems design.

One observation was that "there has been little experience of operations with a mixed load, and practically no integrated data processing." In the matter of payroll accounting, "virtually no pay is issued by credit to a bank account. There is thus no problem of outsorting to bank account order and opportunity for mechanization at this point is absent."

Common language: "The restriction to single-function applications has reduced emphasis on the need for a common language.... There is general confidence that other types of machine language can be dealt with by engineers who are ready to design 'black boxes' to convert between various languages."

Benefit of ADP: "...two distinct schools of thought....One view was that the benefits were mostly indirect...improved effectiveness.... The second school was able to point to concrete savings...."

Programing can be mastered by most people

Programing: "...taken very much for granted as an art which can be acquired by most reasonably intelligent people. This may have arisen from the increasing use of auto-code by the main manufacturers..."

Magnetic tape handling: "...it might need about one person per four tape units to do this effectively."

Sorting: "...for pure sorting the punched-card method was the cheaper, but...where the use of the A. D. P. machine enabled sorting to be combined with tabulation and some analysis the process became economic on the larger machine.... The desire to sort has led to the move toward larger core stores...."

Maintenance: "there appears to have been little attempt to evaluate maintenance procedures, for example by comparing the percentage of effective time obtained when different maintenance arrangements were adopted. The only example seen was at the Department of Employment in Sacramento where the time available for maintenance had been changed from seven daily periods of 2 hours each to a single period of 14 hours...on Monday of each week."

IDEAS FOR MANAGEMENT

Systems and Procedures Association, 10th Annual Meeting Proceedings, 1957.

The Proceedings of the SPA Annual Meeting of 1957 are now available in their familiar form. Part Three is concerned with EDP. Applications; Part Four with EDP Equipment. The rest of the eleven parts covers many areas of systems work, including a rather interesting word-for-word transcript of a round table on systems education.

Among the papers on EDP applications is one which describes the loan processing application of the Bank of America. One EDP center in San Francisco and one in Los Angeles process the loans of the branch banks in each area. At the close of each day loan payments are forwarded to the centers by messengers. Entries are made on conventional tab equipment and transferred to magnetic tape. The tape is then processed against the master loan file. New registers and reports are printed from the updated tapes and are returned to the branches the next morning along with the original loan entries. The centers also prepare past-due notices, and other listings and notices as needed. Tape-producing adding machines are now being installed in branches to eliminate the keypunch operations at the center.

In the paper titled "Preparing for Electronic Data Processing," Mr. J. F. Buehner of American Potash and Chemical Corporation, gives a very complete outline of the requirements for planning and installing an EDP system.

Other papers included in the proceedings are reviewed in this issue of DPD on pages 7, 9, 11.

The proceedings may be ordered from The Systems and Procedures Association of America, 4463 Penobscot Building, Detroit 26, Michigan. Price: $16.

DEVELOPING AN ELECTRONIC APPROACH TO COST ACCOUNTING

From "Ideas for Management," SPA Meeting Proceedings, 1957.

Cost accounting information may be derived in an EDP system from job ticket information and the inventory control operation, as proposed in this paper. A labor and material cost variance report may be produced by processing the parts requirements tape against the inventory master file for each assembly. This can be useful in deciding whether to make the part in the plant or sub-contract it.

By processing the information from job tickets, the cost accountant can get the actual labor cost of each operation, and exception reports can be produced to show employees causing unusual variances in the schedule, such as machine failure. An operations file tape

includes inventory identification for each shop operation so that inventory usage for each job ticket may be updated in the inventory file. From this may be obtained the daily variance for material within production runs on a single product. A labor distribution report may then be produced in any required sequence, as well as payroll records, and a variance cost report by product for labor and material (to determine actual and standard costs for each operation performed).

INTEGRATING DATA PROCESSING WITH ELECTRONIC EQUIPMENT

N.A.A. BULLETIN, May 1958; entire issue.

The entire issue of the N. A. A. Bulletin is devoted to various aspects of EDP. The opening article is an elementary description and explanation of computers, followed by an article which describes in detail the meaning of "integrated data processing" and gives a general approach to studying the potential for EDP in a business.

The next section consists of two articles which contrast two methods of conducting computer utilization studies. The first approach is the traditional one of the "team study," resulting in the quick-pay-off applications, such as payroll. The second approach is the "clerical factory" one, in which the manual systems are studied and improved, and mechanized for top efficiency.

Auditing checks

In the article, "Impact of Electronic Data Processing on Auditing," C. R. Jauchem of the House of Representatives Post Office and Civil Service Committee, covers some of the problems to be faced by the auditor in providing auditing checks. He foresees some original data being produced on magnetic tape or other media not readily interpreted by the auditor, requiring new methods of verification. When data is entered into the EDP machine with punched cards or punched tape, they should be "key verified," or checked by a second operator to assure accuracy. The use of predetermined control totals is important; for example, predetermined control totals of hours and pay rates in a payroll application. "Generally speaking, the parity check is one of the most important internal check features on all electronic data processing." Another appropriate audit check would be the review of machine time records. And "to the extent possible, print-outs required for operating needs should be made to serve auditing requirements also."

EDP cost allocation

In "Allocating the Costs of a Data Processing Department," Gordon F. Pearson of North American Aviation reports that three cost centers are maintained: electronic data processing machines, tabulating, and key-punch. Each tab machine has a usage card, put on each machine at the beginning of the shift. Operators write the start and stop time for each job, and non-productive time during the day. Computer time is calculated automatically by a timeclock arrangement on which the operator rings in and out for each job. Jobs with data being used by more than one department are usually charged to the primary user, with specialized reports being charged

to the departments getting them. However, increasing complexity of cost analysis suggests that total computer costs can be treated in total as an administrative expense, although engineering computations will probably continue to be charged to direct accounts.

HIDDEN ADVANTAGES IN EDP INSTALLATIONS

OFFICE EXECUTIVE, June 1958; page 36.

Three less obvious advantages of electronic data processing systems are suggested: 1. The relative inflexibility of machine operation forces the data processing into a logical, standardized procedure. 2. The hourly processing cost is concentrated in such a high dollar figure that every processing step is constantly under scrutiny for possible savings. 3. EDP provides the means of producing management information that otherwise would be impossible to obtain or would be economically unjustified.

AUTOMATION—TECHNOLOGY'S NEW FACE

Jack Rogers
Published by the Institute of Industrial Relations, University of California, Berkeley, California.

This small booklet of 94 pages contains a general discussion of automation in industry and business, including the factory as well as the office. It speaks of the implications, the advantages, the effect on employment and labor conditions. The approach is the philosophical one which has been explored by others in books and articles. This is easily read and handy in size, and will be a good choice for those who wish to know what the significance of automation may be in the near future. Price: 50¢ per copy, less for volume orders.

PICTORIAL INFORMATION PROCESSED ON A DIGITAL COMPUTER

COMPUTERS AND AUTOMATION, May 1958; pages 16-19.

Information furnished by the National Bureau of Standards is given on experiments in processing pictorial information on the SEAC. ((See DPD June 1958, page 4: "Processing Pictorial Information on Digital Computers."))

Equipment

NEW DEVICE ELIMINATES SOME INVENTORY PUNCH CARD USE

ELECTRONIC NEWS, May 26, 1958.

((The following information has been supplemented with data supplied by Mr. Frank Calhoun of Safeway Stores.))

Punch cards for inventory maintenance have become a large cost factor at Safeway Stores. This has prompted Frank B. Calhoun and Robert Goldwater of the grocery chain's Oakland headquarters to design an inventory device which automatically produces a punched paper tape as the inventory information is entered. The device may be moved along the aisles of a warehouse or supermarket in the standard inventory procedure. The store order guide is mounted on a table on the left side of the device, with a movable guide line finder which automatically records the item printed on the store order guide as it is moved to the desired item, and as the quantities are recorded on the control panel on the right side. A group of switches may be set to automatically record the date, price group, warehouse number, and store order guide page number. The punched tape may be used as a teletype tape or as direct entry to a computer.

ELECTRONICS SPEEDS PARCEL POST SORTING

RAILWAY AGE, May 12, 1958; page 12.

MAIL SORTER BORROWS COMPUTER METHODS

CONTROL ENGINEERING, June 1958; page 21.

At the Pennsylvania RR's Philadelphia Station, an electronic package sorter designed and built by Stewart-Warner Electronics is sorting packages 8 to 12 hours faster than by the old manual method. Packages are unloaded from trucks on to a 220-ft conveyor belt, one package for each 3-foot section of belt. As the package passes a coding station, keypunch operators punch the code number of the package's destination. The information is processed in the system's memory so that at the proper time on down the line, an electronically actuated paddle will sweep the package off onto the correct conveyor and thence to a waiting truck.

ELECTRONIC MAIL SORTER USES CONDUCTIVE INK

CONTROL ENGINEERING, June 1958; page 23.

The British Post Office has developed an electronic sorting and cancellation machine which automatically faces letters in the required position for canceling by means of the electrically conductive ink in the stamps.

REVIEW OF COMPUTER PROGRESS IN 1957

IRE TRANSACTIONS ON ELECTRONIC COMPUTERS, March 1958; pages 65-68.

A resume of the new machines available during 1957 is given, along with a list of the papers presented at major computer conferences.

References

The addresses of publishers and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in obtaining further information about the articles or books listed.

American Business
4660 Ravenswood
Chicago 40, Illinois

The Accountant
4' Drapers' Gardens
Throgmorton Avenue
London EC2, England

Automation Progress
Stratford House
9 Eden Street
London, N. W. 1, England

Banking
12 East 36th Street
New York 16, New York

Business
Mercury House
109-119 Waterloo Road
London S. E. 1, England

Computing News
12805 - 64th Avenue South
Seattle 88, Washington

Computers and Automation
815 Washington Street
Newtonville 60, Massachusetts

Control Engineering
330 West 42nd Street
New York 36, New York

The Controller
Two Park Avenue
New York 16, New York

Electronic News
7 East 12th Street
New York 3, New York

I. R. E.
One East 79th Street
New York, New York

N. A. A. Bulletin
505 Park Avenue
New York 22, New York

O. & M. Bulletin
Treasury Chambers
Great George Street
London S. W. 1, England

Office Equipment News
146 Bates Road
Montreal 8, Canada

Office Executive
Willow Grove, Pennsylvania

Operational Research Quarterly
c/o Peter B. Myers
Bell Laboratories
Murray Hill, New Jersey

Operations Research
Mt. Royal and Guilford Avenues
Baltimore 2, Maryland

Product Engineering
330 West 42nd Street
New York 36, New York

Railway Age
30 Church Street
New York 7, New York

Systems and Procedures Assoc.
4463 Penobscot Building
Detroit 26, Michigan

Comment

SOME COLLEGE COURSES IN EDP

The following college courses for 1958-59 have come to our attention during the past month. There are undoubtedly many more scheduled courses in EDP, and we hope our readers will inform us of any they know about. In some cases it was difficult to distinguish certificate and extension courses from regular graduate and undergraduate courses. For this reason, persons interested in credit toward degrees should write the college or university for accurate information. We regret that space limitations prevented including descriptions of the courses listed.

AMERICAN UNIVERSITY

Courses: 41.566; Computer Design I (Fall)
41.567; Computer Design II (Spring)
55.520; Automatic Data Processing Systems (Fall, Spring)
55.521; Problems of Automatic Data Processing Systems (Spring)
31.053; Fifth Institute on Electronics in Management (no credit)

Undergraduate Course, evening classes

Course Dates: School year 1958-59

Information: John H. Smith, Chairman, Department of Mathematics and Statistics, The American University, Massachusetts and Nebraska Avenues, N. W., Washington 16, D. C.

ARIZONA STATE COLLEGE

Courses: Accounting 444; Machine Accounting Procedures
Gen. Bus. Admin. 301, 302; Mechanized Data Processing
Gen. Bus. Admin. 401g; Business Systems Analysis
Gen. Bus. Admin. 402g; Data Processor Programming

Undergraduate Courses: 444, 301, 302, 401g, 402g

Graduate Courses: 401g and 402g

Course Dates: School year 1958-59

Information: Office of the Dean, College of Business Administration, Arizona State College, Tempe, Arizona

BRIDGEPORT ENGINEERING INSTITUTE

Course: EDP survey course, including description of computers and their use in business applications

Extension Course, no degree credit

Course Dates: Begins October 20, 1958 for 22 weeks

Information: Richard W. Pomeroy, 1361 Madison Avenue, New York, N. Y.

BOSTON UNIVERSITY

Courses: XM 101E; Introduction to Data Processing, I
XM 102E; Introduction to Data Processing, II
XM 401E; Computer Programming (IBM 650)
XM 402E; Computer Programming - Advanced
XM 411E; Data Processing Systems

Extension Courses: Evening Division

Course Dates: School year 1958-59

Information: J. Ehlman, Director, Computation Laboratory, Boston University, 725 Commonwealth Avenue, Boston 15, Massachusetts

CANISIUS COLLEGE

Courses: Mg. E. 351; Introduction to Electronic Data Processing (Fall)
Mg. E. 355; Commercial Applications of Computers (Spring)
Ch. E. 352; Introduction to Scientific Computers (Spring)
Undergraduate Courses leading to BS in Bus. Admin. (Mg. E 351, 355)
Graduate Course leading to MS in Chemistry (Ch. E. 352)
Information: Dr. Austin Murphy, Dean, School of Business Administration
Canisius College, Buffalo 8, New York

ILLINOIS INSTITUTE OF TECHNOLOGY

Courses: Mathematics 457 (First semester); Introduction to Digital Computing
Business and Economics 426 (Repeated first and second semesters);
Automatic Computers for Business Systems
Undergraduate Course: First course above leads to degree in mathematics
Extension Course: Second course above leads to degree in business and economics, if desired
Course Dates: School year 1958-59, semesters as noted
Information: Dean of the Evening Division, Illinois Institute of Technology,
Chicago 16, Illinois

LEHIGH UNIVERSITY

Course: I. E. 408; Data Processing (LGP-30 Computer)
Graduate Course in Industrial Engineering
Course Dates: School year 1958-59
Information: Registrar, Lehigh University, Bethlehem, Pennsylvania

LOS ANGELES STATE COLLEGE

Courses: Bus. 494; Electronic Systems and Equipment
Bus. 495; Electronic Programming
Undergraduate Courses leading to BS in Business Administration
Extension Courses may be established on request by 20 or more persons.
Course Dates: School Year 1958-59
Information: Alfred Ehrhardt, Assistant Dean of Instruction,
Los Angeles State College, 5280 Gravois Avenue,
Los Angeles 32, California

MISSISSIPPI STATE COLLEGE

Courses: GB 653; Electronic Data Processing--Fundamentals
GB 753; Electronic Data Processing--Intermediate
BG 853; Electronic Data Processing--Advanced
Undergraduate Courses: Electives leading to BS in Business
Course Dates: School year 1958-59
Information: Dean James M. Parrish, School of Business and Industry,
State College, Mississippi

OHIO STATE UNIVERSITY

Courses: Mathematics 692, 693, 694, 695, 698
Undergraduate Courses in College of Arts and Sciences leading toward BS in Mathematics
Graduate Courses leading toward an MS
Course Dates: School year 1958-59
Information: Entrance Board, Administration Building, Ohio State University,
Columbus 10, Ohio

PASADENA CITY COLLEGE

Course: 41; Coding for Digital Computers
Undergraduate Course
Course Dates: School year, 1958-59
Information: Registrar, Pasadena City College, 1570 East Colorado Street, Pasadena, California

PURDUE UNIVERSITY

Courses: Math 515 and 516, sequential courses in numerical analysis, utilizing the Purdue Compiler and Datatron 205.
Undergraduate Courses leading to BS
Graduate Courses leading to MS
Course Dates: School year 1958-59
Information: L. Duane Pyle, Acting Head, Computing Laboratory, Purdue University, Lafayette, Indiana

SAN DIEGO STATE COLLEGE

Course: Bus. Adm. 141; Electronic Data Processing
Undergraduate Course leading to BS in Business Administration
Course Dates: Fall Semester, 1958, evening class
Information: Mr. Charles L. Terrel, Mrs. Frances Torbert, or Dr. Charles W. Lamden, San Diego State College, San Diego, California

SAN JOSE STATE COLLEGE

Course: 7.1; Business Data Processing
Undergraduate Course in Business Management
Course Dates: School year 1958-59
Information: Prof. E. J. Laurie, Business Management Department, San Jose State College, San Jose 14, California

STANFORD UNIVERSITY

Course: 161; Introduction to Data Processing
Undergraduate Course leading to BS in Industrial Engineering
Course Dates: School year 1958-59
Information: The Registrar, Stanford University, Stanford, California

TEXAS CHRISTIAN UNIVERSITY

Courses: Accounting 348; Accounting with Electronic Data Processing Equipment
Management 340; Electronic Data Processing for Business and Industry
Extension Courses
Course Dates: School year 1958-59
Information: Cortell K. Holsapple, Dean, The Evening College, Texas Christian University, Fort Worth 9, Texas

UNIVERSITY OF CALIFORNIA, BERKELEY

Course: EE 153 A, B. Digital Computer Laboratory. Use and operation of automatic digital computing equipment.
Undergraduate Course leading to BS degree
Course Dates: School year 1958-59
Information: John R. Whinnery, Division Chairman, Division of Electrical Engineering, Dept. of Engineering, University of California, Berkeley 4, California. Or write to the Registrar.

UNIVERSITY OF CINCINNATI

Courses: Econ. 451, 452, 453; Business Problems and Data Processing. Course includes laboratory sessions using an IBM 650 for problem solutions.

Undergraduate Course leading to BBusAd

Course Dates: School year 1958-59 (4 terms)

Information: Dr. John W. Ashley, Department of Economics, College of Business Administration, University of Cincinnati, Cincinnati 21, Ohio

UNIVERSITY OF ILLINOIS

Courses: Bus. Adm. 373; Electronic Data Processing for Business

The following courses are listed by the Mathematics Department:
365 - Digital Computer Methods for Statistical Data Processing
384 - Logical Design of Automatic Digital Computer Circuits
385 - Digital Computer Programming
391, 392 - Boolean Algebras with Applications to Computer Circuits

Undergraduate Courses

Course Dates: School year 1958-59

Information: Prof. R. E. Schlosser, Business Administration Dept.; Department of Electrical Engineering; Department of Mathematics; or Department of Physics; University of Illinois, Urbana, Illinois

UNIVERSITY OF PENNSYLVANIA, WHARTON SCHOOL

Course: A course on "the analysis of the problems of supply and demand for managerial information" is adapted to the three levels of undergraduate, graduate, and extension.

Undergraduate, Graduate and Extension Course, as adapted

Course Dates: School year, 1958-59, Fall and Spring semesters

Information: Dean, Wharton School, University of Pennsylvania, Philadelphia 4, Pennsylvania

UNIVERSITY OF PITTSBURGH

Courses: Math 121, 122; Introduction to the Mathematics of Digital Computation

Business Research 121 and Industrial Engineering 121; Data Processing Principles and Methods

Business Research 122 and Industrial Engineering 122; Business Applications of Data Processing Equipment

Business Research 127, 128; Managerial Aspects of Electronic Data Processing

The following are technical design courses:

Elec. Eng. 279; Digital Computing Machines I
Elec. Eng. 280; Digital Computing Machines II
Elec. Eng. 285; Switching Circuitry
(The IBM 650 computer is used)

Undergraduate Courses: Nos. 100-199

Graduate Courses: Nos. 100-299

Course Dates: School year 1958-59

Information: Registrar, E. A. Batchelder, 1817 Cathedral of Learning, University of Pittsburgh, Pittsburgh 13, Pennsylvania

UNIVERSITY OF SOUTHERN CALIFORNIA

Courses: Accounting 565; Accounting Machine Systems (Electronic)[1]
BA 527; Introduction to Electronic Business Systems[2]
BA 528; Basic Data Processing Machine Operation[2]
IE 464L; Systems Engineering (Spring only)[3]
Math 456; Mathematics of High-Speed Computers[4]
Math 457L; Mathematics of High-Speed Computers Laboratory[4]

Undergraduate Courses: IE 464L, Math 456 and 457L, leading to BS
Graduate Courses: Acc 565, BA 527, BA 528, leading to MBA
Course Dates: School year 1958-59
Information:
1. Accounting Department, School of Commerce
2. Business Administration Department, School of Commerce
3. Department of Industrial Engineering, School of Engineering
4. Department of Mathematics, College of Letters, Arts, Science
University of Southern California, Los Angeles 7, California

UNIVERSITY OF TENNESSEE

Course: Bus. Adm. 433; Electronic Data Processing
Extension Course - two nights per week for eleven weeks
Course Dates: September 22, 1958 through December 1958
Information: Professor George A. Wagoner, Head, Business Education and Office Administration, University of Tennessee, Knoxville, Tennessee

UNIVERSITY OF TORONTO

Courses: Physics 18; The Logical Basis of Digital Computing Machines
Physics 25; Programming for Digital Computers
*High Speed Data Processing
*Engineering Techniques for Digital Computers
Graduate Courses leading to MA and PhD in Physics and Mathematics
*Extension Courses
Course Dates: School year 1958-59
Information: John P. Stewart, Assistant Registrar, University of Toronto, Toronto 5, Canada

UNIVERSITY OF WASHINGTON

Courses: Bus. Statistics 344; Administrative Applications of High-Speed Computers (Winter Quarter)
Bus. Statistics 444; Advanced Administrative Applications of High-Speed Computers (Spring Quarter)
Math 374; Principles of Digital Computers and Coding (Autumn Quarter)
Undergraduate Courses - electives
Course Dates: School year 1958-59
Information: Registrar, University of Washington, Seattle, Washington

WESTERN RESERVE UNIVERSITY, SCHOOL OF LIBRARY SCIENCE

Courses: 572 Machine Literature Searching
574 Language Engineering
582 Special Studies in Documentation
Graduate Courses leading to MS in Library Science
Course Dates: School year 1958-59
Information: Dean Jesse H. Shera, School of Library Science, Western Reserve University, Cleveland 6, Ohio

Training

Electronic Data Processing for Business and Industry (Course 10), sponsored by Canning, Sisson and Associates

Date: July 28 through August 1, 1958
Place: New York (Hotel Biltmore)
Fee: $250
Program: Emphasis on the applications aspect of electronic data processing, planning for an EDP system
For whom: Management personnel charged with setting up an EDP system
Information: Canning, Sisson and Associates, 1140 South Robertson Blvd., Los Angeles 35, California

UNIVAC Training Program for college and university faculty--

Nine classes in various cities in U.S. and Canada provide training for faculty -- and administrative officials in Univac Systems. Courses run from June to September. For information, write: Remington Rand, Univac Educational Department, 315 Fourth Avenue, New York 10, New York.

Electronic Digital Computing and Applications--Advanced Programming Techniques

Date: August 18-22, 1958
Place: University of Houston
Fee: $100
Information: Computing and Data Processing Center
University of Houston, Houston 4, Texas

Intensive Courses in Industrial Engineering--Elements of Integrated and Automatic Data Processing

Date: September 8-19, 1958
Place: Washington University, St. Louis, Mo.
Fee: $450
Information: University College, Washington University, St. Louis 5, Missouri

Installing Electronic Data Processing Systems

Date: October 13-17, 1958
Place: New York (Hotel Roosevelt)
Fee: $250
Information: Canning, Sisson and Associates, 1140 South Robertson Blvd., Los Angeles 35, California

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Meetings

5th Annual Symposium on Computers and Data Processing, sponsored by Denver Research Institute

Date: July 24-25, 1958
Place: Denver, Colorado (Albany Hotel)
Information: C. A. Hedberg, Denver Research Institute, University of Denver, Denver, Colorado

WESCON

Date: August 19 through 22, 1958
Place: Los Angeles, California (Ambassador Hotel)
Information: WESCON, 1435 South La Cienega Blvd., Los Angeles 35, California

Technical Meeting on Automatic Decision-making, sponsored by Los Angeles Chapter of A. C. M.

Date: August 21, 1958
Place: University of California at Los Angeles

Power Industry Computer Application Conference

Date: September 15-17, 1958
Place: King Edward Hotel
Information: Mr. J. R. Leslie, c/o Ontario Hydro, 620 University Avenue, Toronto 2, Ontario, Canada

Instrument Society of America Automation Conference

Date: September 15-19, 1958
Place: Philadelphia, Pennsylvania (Convention Hall)

International Systems Meeting, Systems and Procedures Association

Date: October 13-15, 1958
Place: Pittsburgh, Pennsylvania (Hotel Penn-Sheraton)
Information: Mr. A. M. Motter, Jones & Laughlin Steel Corp., #3 Gateway Center, Pittsburgh 30, Pennsylvania

The Institute of Management Sciences Annual Meeting

Date: October 16-18, 1958
Place: Philadelphia, Pennsylvania

Fifth Annual Computer Applications Symposium, Armour Research Foundation

Date: October 29, 30, 1958
Place: Chicago, Illinois
Information: Armour Research Foundation, 10 West 35th Street, Chicago 16, Illinois

Fourth Electronic Business Systems Conference, sponsored by Western Division of NMAA

Date: October 30, 31, 1958
Place: Seattle, Washington (Olympic Hotel)
Information: E.B.S. Conference, National Machine Accountants Assoc., Western Division, P.O. Box 134, Seattle 11, Washington

International Conference on Scientific Information

Date: November 16-21, 1958
Place: Washington, D. C. (Mayflower Hotel)
Information: Secretariate, International Conference on Scientific Information, National Academy of Sciences, 2101 Constitution Avenue, N. W., Washington 25, D. C.

National Physical Laboratory Symposium and Electronic Computer Exhibition

Date: November 28-December 4, 1958
Place: London, England
Information: C. V. Wattenbach, Deputy Managing Director, Dictograph Telephones, Ltd., London, England

Eastern Joint Computer Conference

Date: December 1958
Place: Philadelphia, Pennsylvania (Bellevue Stratford Hotel)

Western Joint Computer Conference

Date: March 3-5, 1959
Place: San Francisco, California (Fairmont Hotel)
Theme: "New Horizons with Computer Technology"
Information: WJCC, Box 381, Station A, Palo Alto, California

International Conference on Information Processing

Date: June 13-21, 1959
Place: Paris or Rome (decision later)
Information: U.S. Committee for the First International Conference on Information Processing, Box 4999, Washington 8, D. C.

1955 ACM National Conference

Date: Summer, 1959
Place: M. I. T.
Information: F. Verzuh, Massachusetts Institute of Technology, Cambridge, Mass.

SHARED PROGRAMING GROUP

USE - July 30--August 1, 1958, San Francisco

SHARE - Sept. 10-12, 1958, San Francisco